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eight under the heading "Algebra"; thirteen under "Theory of numbers"; one hundred and twenty under "Analysis"; twenty-nine under "Groups"; seventy-six under "Geometry"; twelve under "Applied mathematics."—Volume 21, no. 1, January, 1920: "The strain of a gravitating sphere of variable density and elasticity" by L. M. Hoskins, 1-43; "The geometry of hermitian forms" by J. L. Coolidge, 44-51; "Certain types of involutorial space transformations" by F. R. Sharpe and V. Snyder, 52-78.

AMERICAN DOCTORAL DISSERTATIONS.

E. F. SIMONDS, "Invariants of differential configurations in the plane," *Transactions of the American Mathematical Society*, 1918, volume 19, pp. 222-250 (Columbia, 1917).

UNDERGRADUATE MATHEMATICS CLUBS.

EDITED BY U. G. MITCHELL, University of Kansas, Lawrence.

CLUB TOPICS.

Although much has already been printed concerning the abacus and its uses,¹ we believe that our readers will find the following article by Professor Leavens decidedly interesting and helpful since it gives an independent discussion based upon the personal impressions and first-hand information of a westerner who has come into contact with the present-day use of the abacus in the far east.

17. THE CHINESE SUAN P'AN.

By DICKSON H. LEAVENS, College of Yale in China.

The Chinese suan p'an² or abacus is familiar to many from an occasional sight of it on a laundryman's table, but it is perhaps usually regarded either as a device full of the mystery of the East and beyond the grasp of the Occidental, or as an instrument fit only for the ignorant "Celestial" and beneath the notice of one who has studied arithmetic.

A little investigation, however, will show one that it is not only perfectly

¹ Two of the best discussions in English are probably C. G. Knott's article, cited below, and Leslie's *Philosophy of Arithmetic* (Edinburgh, 1820), pp. 15-100. Leslie gives, in great detail, examples of the representation of numbers in different scales of notation and of operations by means of them. From his discussion one can readily see how certain theorems on divisibility of numbers and even the summation of special infinite descending series may be inferred from the use of the abacus.

Some excellent illustrations and references to the literature of the abacus can be found in Smith and Mikami's *History of Japanese Mathematics* cited below. Other readily accessible sources of information are the descriptions given in current histories of mathematics and articles in encyclopedias under the titles "Abacus" and "Calculation."

² In this MONTHLY (1919, 256), it is noted that this word, with various spellings, appears in the *New English Dictionary*, but that "the Chinese word Soroban . . . is not given." Soroban, however, is not Chinese, but Japanese, being the Japanese pronunciation of the same characters, which are used in the written language of both countries.

The same note (following the dictionary) translates suan p'an wrongly as reckoning board. The Chinese character for board is romanized pan, hence the error; but it is quite a different character from the one here used, which means a *plate* or *tray*; the pronunciation is also different, p in the most used system of romanization representing practically our b, while p' is similar to our p.